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L-05-091

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: Beaver Valley Power Station, Unit No. 2
BV-2 Docket No. 50-412, License No. NFP-73
Reactor Head Inspection 60-Day Report for 2R11

Reference:
1) First Revised Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors, dated February 20, 2004

During the recent Beaver Valley Power Station (BVPS) Unit 2 2R11 Refueling Outage, inspections of the reactor pressure vessel (RPV) head and associated penetration nozzles were performed. In accordance with NRC Order EA-03-009 (Reference 1) Section IV.E, the 60-day report, detailing the inspection results is being provided. The BVPS Unit 2 Evaluation Report for the 2R11 RPV Head Inspection is enclosed with this letter.

There are no new regulatory commitments contained in this letter. If there are any questions concerning this matter, please contact Mr. Larry R. Freeland, Manager, Regulatory Compliance at 724-682-4284.

Sincerely,

L. W. Pearce

L. William Pearce

Enclosure

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Senior Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator

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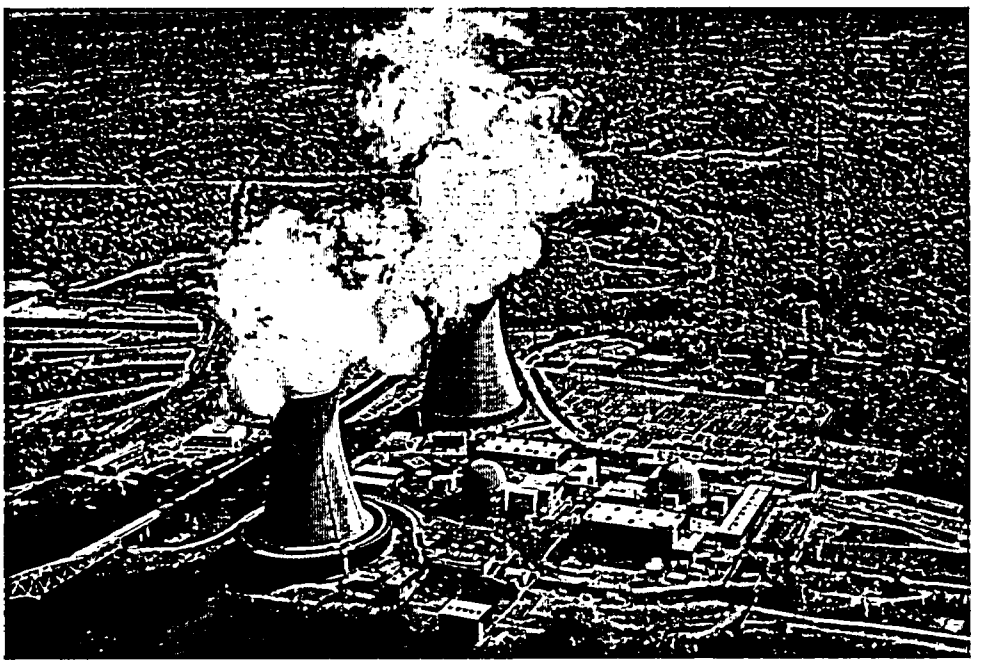

Evaluation Report for

2R11

Beaver Valley Unit 2

Reactor Vessel Head Penetration

Inspections

(Ref: Order EA-03-009)

April 2005

Enclosure to Letter L-05-091
Reactor Head Inspection 60-Day Report for 2R11

References

1. EA-03-009, "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," February 20, 2004.
2. L-03-088, "Order (EA-03-009) Relaxation Request," BVPS Unit 2, July 29, 2003.
3. L-03-190, "Reactor Head Inspection 60-Day Report," BVPS Unit 2, 2R10 Refueling Outage, December 9, 2003.
4. L-03-198, "Supplement to Order (EA-03-009) Relaxation Request," BVPS Unit 2, December 19, 2004.
5. L-04-006, "Transmittal of WCAP-16144-P for Order (EA-03-009) Relaxation Request," BVPS Unit 2, January 27, 2004.
6. "Relaxation of the Requirements of Order EA-03-009, Dated February 11, 2003, Regarding Examination Coverage for Reactor Pressure Vessel Head Penetration Nozzles for Beaver Valley Power Station, Unit No. 2," August 2, 2004.
7. L-04-030, Reply to First Revised Order for BVPS, March 5, 2004

Introduction

Reactor Pressure Vessel (RPV) Head Inspections were performed at Beaver Valley Power Station (BVPS) Unit 2 during the 2R11 Refueling Outage in accordance with the First Revised NRC Order EA-03-009 (Reference 1). The Order establishes criteria by which licensees must perform periodic inspections of the reactor vessel head. FirstEnergy Nuclear Operating Company (FENOC) provided a response to the Order for BVPS via letter L-04-030, dated March 5, 2004.

RPV Head Configuration

The BVPS Unit 2 RPV contains sixty-five (65) Alloy 600 penetration tubes that are interference fit in the reactor vessel head and attached with Alloy 182/82 partial penetration J-groove welds. The head also contains one Alloy 600 vent line that is clearance fit in the reactor vessel head and attached with an Alloy 182/82 partial penetration J-groove weld.

The 65 Control Rod Drive Mechanism (CRDM) penetration tubes measure 4.0" on the outside diameter (OD) and have an inside diameter (ID) dimension of 2.75". The wall thickness is 0.625". The RPV head vent line has a nominal OD dimension of 1.0" and a nominal ID dimension of 0.770".

Susceptibility Ranking

The cumulative Effective Degradation Years (EDY) of the BVPS Unit 2 reactor head was calculated at the conclusion of Cycle 11 in accordance with Paragraph IV.A of the Order. The Unit 2 RPV head has maintained one consistent bulk head temperature of 595°F for its operating history, as reported in Table 2-1 of EPRI MRP-48. The cumulative EFPY for the Unit 2 RPV head through Cycle 11 was calculated to be 14.01. These plant-specific inputs were used to calculate EDY_{2R11} per the equation provided in Paragraph IV.A of the Order:

$$EDY_{2R11} = \sum_{j=1}^{n}\left\{\Delta EFPY_j \exp\left[-\frac{Q_i}{R}\left(\frac{1}{T_{head,j}} - \frac{1}{T_{ref}}\right)\right]\right\}$$

$$EDY_{2R11} = \sum_{j=1}^{1}\left\{(14.01 years)\exp\left[-\frac{(50 kcal/mole)}{(1.103x10^{-3} kcal/mole°R)}\left(\frac{1}{(1054.67°R)} - \frac{1}{(1059.67°R)}\right)\right]\right\}$$

$$EDY_{2R11} = 11.44$$

The calculated EDY of 11.44 places the BVPS Unit 2 RPV Head in "Moderate" susceptibility per the table in Paragraph IV.B of the Order.

Required Inspections

As a "Moderate" susceptibility plant, the inspection requirements of Paragraph IV.C.(2) of the Order apply to the BVPS Unit 2 RPV head. Paragraph IV.C.(2) states that

> RPV head and head penetration inspections shall be performed such that at least the requirements of paragraph IV.C.(5)(a) or paragraph IV.C.(5)(b) are performed each refueling outage. In addition the requirements of paragraph IV.C.(5)(a) and paragraph IV.C.(5)(b) shall each be performed at least once over the course of every 2 refueling outages.

Examinations meeting the requirements of Paragraph IV.C.(5)(b) and associated Relaxation Request were completed during the BVPS 2R10 refueling outage in Fall 2003 (References 2 – 6). As such, the examination requirement for the BVPS 2R11 refueling outage is as defined by Paragraph IV.C.(5)(a) of the Order.

Specifically, a visual inspection of the RPV head was performed, including bare metal visual examination of the RPV head surface and 360° around each RPV head penetration, in accordance with Paragraph IV.C.(5)(a) of the Order. Remote visual examinations were performed by Westinghouse/R. Brooks and Wesdyne VT-2 qualified personnel, in accordance with the requirements of the Westinghouse Quality Assurance Program.

The visual examinations performed during 2R11 were conducted in accordance with site-specific field service procedures. The examinations were recorded in VT-2 inspection logs and videotapes. The completed examinations received final review by the FENOC Visual Level III examiner and the onsite ANII.

Inspection Results

VT-2 visual inspection of 360° around each of the 65 CRDM penetrations and the vent line showed no indication of penetration leakage characteristic of a through-wall leak. The carbon steel assessment performed on 100% of the RPV head carbon steel base metal inside the ventilation shroud and insulation found no degraded conditions on the RPV head surface.

Conclusion

RPV head inspections were completed during 2R11 in accordance with the requirements of the First Revised Order EA-03-009. Visual inspection of the top of the RPV head in accordance with Paragraph IV.C.(5)(a) showed no indication of RPV head penetration leakage or degradation of the carbon steel surface.

For the BVPS Unit 2 2R12 refueling outage, the projected susceptibility is "High". At that time, the testing frequency of Section IV, paragraph C.(1) will apply and examinations under Section IV, Paragraphs C.(2)(a) and (b), as modified by Reference 6, will be performed every refueling outage.